
4. FISHERY DATA UPDATE

In this section of the 2001 SAFE report, HMS fishery data, with the exception of some data on Atlantic sharks, are analyzed by gear type; section 4.6 provides a summary of landings by species. While most HMS fishermen target particular species, the non-selective nature of most fishing gear promotes more effective analysis and management on a gear-by-gear basis. In addition, issues such as bycatch, and safety are generally better addressed by gear type. A summary of catch statistics by species can be found in the National Report of the United States:2000 (NMFS, 2000a), as well as in Section 4.6 of this report.

The revised list of authorized fisheries (LOF) and fishing gear used in those fisheries became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, “no person or vessel may employ fishing gear or participate in a fishery in the exclusive economic zone (EEZ) not included in this LOF without giving 90 days’ advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic highly migratory species (HMS), the Secretary of Commerce (Secretary).” Acceptable HMS fisheries and authorized gear types for Atlantic tunas, swordfish, and sharks include: swordfish handgear fishery - rod and reel, harpoon, handline, bandit gear; pelagic longline fishery - longline; shark drift gillnet fishery - gillnet; shark bottom longline fishery - longline; shark handgear fishery - rod and reel, handline, bandit gear; tuna purse seine fishery - purse seine; tuna recreational fishery- rod and reel, handline; tuna handgear fishery - rod and reel, harpoon, handline, bandit gear; and tuna harpoon fishery - harpoon. For Atlantic billfish, the only acceptable fishery and authorized gear type is recreational fishery - rod and reel. Species whose life history characteristics may lead to their eventual categorization as highly migratory, but which are not currently under Secretary of Commerce or Regional Council management authority, are covered in two broad categories: Recreational Fisheries (Non-FMP) and Commercial Fisheries (Non-FMP). Species that fit this description may be harvested with the gears listed for these catchall categories.

Due to the nature of SCRS data collection, Table 4.1 depicts a summary of the U.S. portion of HMS catch and landings by species rather than gear type. International catch levels as well as U.S. reported catches, other than sharks, are taken from the 2000 SCRS Report which reflects catch data on a calendar year basis through 1999. The U.S. percentages of regional and total catch for HMS species are presented (Table 4.1) to provide a basis for comparison of U.S. catches relative to other nations/entities. Catch of billfish includes both recreational landings and dead discards from commercial fisheries; catch for bluefin tuna and swordfish include commercial landings and discards. Historical catch levels dating back to 1950 can be found in the SCRS Report and a discussion of typical species-specific U.S. catch levels can be found in the HMS FMP. International catch and landings tables are included for the longline and purse seine fisheries in Sections 4.1.3 and 4.2.3 of this report. At this point, data necessary to assess the U.S. regional and total percentage of international catch levels for Atlantic shark species are

unavailable.

Table 4.1 **Calendar Year 1999 U.S. vs International Catch of HMS (mt ww) other than sharks.**
Source: NMFS, 2000a).

Species	Total International Reported Catch	Region of U.S. Involvement	Total Regional Catch	U.S. Catch	U.S. Percentage of Regional Catch	
Atlantic Swordfish	40,003 (Atlantic and Mediterranean)	North Atlantic (NA) and South Atlantic (SA)	27,377 (11,914 NA, 15,463 SA)	3,087 (500 mt discards) (2,908 + 494 mt discards NA, 179 +6 mt discards SA)	13.1% (28.55% NA, 1.20% SA)	8.97% (includes Med catches)
Atlantic Bluefin Tuna	34,258	West Atlantic	2,771	1,363 (151 mt discards)	49.19%	3.98%
Atlantic Bigeye Tuna	120,883	Total Atlantic	120,883	1,261	1.04%	1.04%
Atlantic Yellowfin Tuna	139,967	West Atlantic	27,632	7,734	30.17%	5.52%
Atlantic Albacore Tuna	64,189	North Atlantic	34,557	314	0.91%	0.49%
Atlantic Skipjack Tuna	163,435	West Atlantic	27,043	148	0.55%	0.09%
Atlantic Blue Marlin	3,316	North Atlantic	1,201	120 (83 mt discards)	9.82%	3.56%
Atlantic White Marlin	908.5	North Atlantic	315	57 (56 mt discards)	8.09%	6.27%
Atlantic Sailfish	827	West Atlantic	546	72 (71 mt discards)	13.19%	8.71%

4.1 Fishery Data: PELAGIC LONGLINE

4.1.1 Overview of History and Current Management

U.S. pelagic longline fishermen began targeting highly migratory species in the Atlantic Ocean in the early 1960s. However, U.S. landings of swordfish did not exceed 1500 mt until the mid-1970s. Since that time, the gear deployed has evolved several times. The majority of fishermen use monofilament mainline that is rigged depending on whether the line is “targeting” tunas or “targeting” swordfish. The term “targeting” is used because there are differences in the location, timing, and gear configuration that are specific to the tuna or swordfish target. For example, yellowfin tuna fishing tends to occur during the day while most swordfish fishing takes place at night. However, use of pelagic longline gear also results in incidental catch of other pelagic species. The incidental catch includes species which are discarded for economic and regulatory reasons. A complete discussion of the pelagic longline fishery can be found in Regulatory Amendment One to the HMS FMP (NMFS, 2000b)

Bycatch in this fishery is discussed in Section 4.1.4 and Section 8. Like fishermen using other fishing gears, pelagic longline fishermen are subject to minimum sizes for yellowfin, bigeye, and bluefin tuna, and swordfish in order to reduce the mortality of small fish. Pelagic longline fishermen are also subject to target catch limits in order to retain bluefin tuna. These regulatory discards compose a large portion of the bycatch in the fishery. In some areas and at certain times of the year, much of the bycatch in this fishery is released dead. Because it is difficult for pelagic longline fishermen to avoid undersized fish in some areas, NMFS has closed areas in the Gulf of Mexico and along the east coast. The intention of these closures is to relocate some of the fishing effort into areas where bycatch is expected to be lower. There is also currently in place a time/area closure for pelagic longline fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures, NMFS would like to require all pelagic longline vessels to report positions on an approved vessel monitoring system (VMS). Time/area closures and VMS considerations are discussed below in Section 4.1.6.

In addition to regulations designed to reduce bycatch, pelagic longline fishermen are subject to quota management for swordfish, sharks and bluefin tuna. Quota monitoring requires seasonal regulations, closures, and target catch requirements. In order to document catch and effort, pelagic longline fishermen are subject to permitting and reporting requirements, including logbooks and observer coverage. In 1999, NMFS established a limited entry system for swordfish, shark, and tuna longline category permits. Pelagic longline fishermen who target swordfish or BAYS tunas must have swordfish, shark, and tuna longline category permits. NMFS is re-evaluating the limited access program and may consider gear-specific permits in the future. Refer to Section 9 for a discussion of limited access options. This gear type is possibly the most regulated of all HMS gear types due to the nature of the gear and its catch/bycatch.

4.1.2 Most Recent Catch and Landings Data

Pelagic longline fishermen encounter as many as 40 different species in a trip. Table 4.1.1 indicates the 1995-1999 catches of HMS by U.S. pelagic longline fishermen in the Atlantic Ocean.

Table 4.1.1 Estimated U.S. Pelagic Longline HMS Catches: Calendar Years 1996-1999 (mt ww)*.
Source: U.S. National Report (NMFS, 1999 and 2000a).

	1996	1997	1998	1999
Swordfish <i>landings</i>	3625.1	3361.9	3169.2	3051.9
Swordfish <i>dead discards**</i>	563.7	455.2	432.7	495.7
Yellowfin Tuna	3285	3773.6	2447.9	3374.9
Bigeye Tuna	660.5	794.8	695.3	929.1
Bluefin Tuna <i>landings</i>	67.9	49.9	48.8	73.5
Bluefin Tuna <i>dead discards***</i>	73.5-168	37.1-148	64-102	30-151
Albacore Tuna	109.4	189.1	180.1	194.5
Skipjack Tuna	0.3	3.5	1.3	2.0
Blue Marlin****	196.5	138.1	52.4	82.1
White Marlin****	67.6	70.8	32.8	56.7
Sailfish****	71.6	57.7	27.1	71.6
Total	5767.3-5861.8	8931.7-9042.6	7194.3-7232.3	8362-8483

*Atlantic sharks are caught on pelagic longlines, however, the methods for reporting data on Atlantic sharks do not allow for their inclusion in this table. The table also does not include other species caught by this gear, e.g., dolphin, wahoo, etc.

**Post-release mortality of swordfish released alive is not estimated by NMFS at this time.

***Estimates of bluefin tuna discards vary depending on method used to calculate discards.

****Indicates longline *dead discards* of these species.

4.1.3 U.S. vs. International Catch

For 1999, the provisional estimate of U.S. vessel landings and dead discards of swordfish (North and South Atlantic) was 3,585 mt (99 percent of these are longline landings and discards). This estimate is somewhat lower than the estimate of 3,660 mt for 1998. Decline in U.S. landings of swordfish from the 1990 level (5,519 mt, North Atlantic only) was at least in part due to U.S. implementation of quotas. The 1999 stock assessment shows a potential reward for these

fishermen who have been subject to increasingly restrictive management measures. With a rebuilding plan in place, it is hoped that the strong year classes of young swordfish will be protected throughout their lives and stock size will begin to increase. Anecdotal evidence indicates more small swordfish are being encountered by pelagic longline fishermen throughout the Atlantic Ocean. The following table indicates the proportion of the harvest that is allocated to the United States.

Table 4.1.2 Estimated International Longline Landings of HMS, Other than Sharks, for All Countries in the Atlantic: 1995-1998 (mt ww)*. Source: NMFS, 1999 and 2000a.

	1996	1997	1998	1999
Swordfish (N.Atl + S. Atl)	31438	30375	24203	25695
Yellowfin Tuna (W. Atl)**	8569	8505	8181	10943
Bigeye Tuna	74880	68198	70302	77356
Bluefin Tuna (W. Atl.)**	528	382	764	914
Albacore Tuna (N. Atl + S. Atl)	23044	22324	20936	24936
Skipjack Tuna***	26	60	89	13
Blue Marlin (N. Atl. + S. Atl.)****	3577	3626	2390	2522
White Marlin (N. Atl. + S. Atl.)****	1171	942	831	833
Sailfish (W. Atl.)****	341	209	830	405
Total	143,574	134,621	128,526	143,617
U.S. Longline Landings (from U.S. Natl. Report, 2000)#	5767.3	8931.7	7194.3	8362-8483
U.S. Longline as Percentage of Longline Total	4.0	6.6	5.6	5.9

* landings include those classified by the SCRS as longline landings for all areas

**Note that the U.S. has not reported participation in the E. Atlantic yellowfin tuna fishery since 1983 and has not participated in the E. Atl bluefin tuna fishery since 1982.

***includes longline and trawl catches for all countries throughout the Atlantic Ocean

****includes U.S. *dead discards*

includes swordfish longline discards and bluefin tuna discards

The U.S. longline fleet has historically accounted for a small percentage of total Atlantic landings of HMS. Even when including U.S. discards for bluefin tuna, swordfish, blue marlin, white marlin, and sailfish, the U.S. percentage still remains right around 5 percent of all longline landings reported to ICCAT. In contrast, U.S. fishermen have been severely restricted in order to

minimize bycatch in this fishery. The United States continues to work internationally to encourage other nations to protect overfished HMS.

4.1.4 Bycatch Issues and Data Associated with the Pelagic Longline Fishery

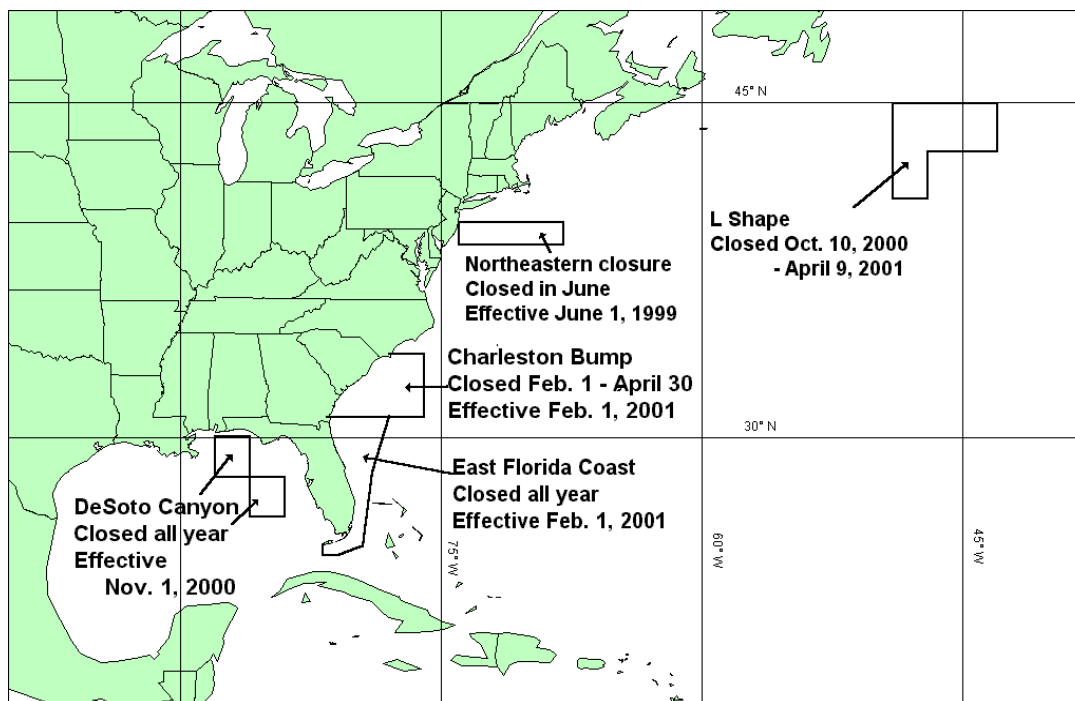
Fish are discarded from the pelagic longline fishery for a variety reasons. As in other HMS fisheries, swordfish, yellowfin tuna, and bigeye tuna may be discarded because they are undersized or unmarketable (e.g., shark bitten). Blue sharks, as well as some other finfish species, are discarded as a result of a limited market (resulting in low prices) and perishability of the product. Large coastal sharks are discarded from this gear during times when the shark season is closed. Bluefin tuna may be discarded because target catch requirements have not been met. All billfish and protected species including mammals, sea turtles, and birds are required to be discarded. In the past, swordfish have been discarded during times when the swordfish season is closed.

Bycatch mortality of marlins, swordfish, and bluefin tuna from all fishing nations may significantly reduce the ability of these populations to rebuild and remains an important management issue. NMFS is also concerned about serious injuries to turtles and marine mammals as a result of interactions with pelagic longline gear.

In order to minimize bycatch and bycatch mortality in the pelagic longline fishery, NMFS published regulations to close areas to longline fishing (Figure 4.1.1) and banned the use of live bait by

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Vessel Monitoring Systems

Vessel monitoring systems are essential to the effective implementation and enforcement of time/area closures and they provide increased communication and safety benefits to pelagic longline fishermen. Further, they facilitate monitoring of this diverse fleet that ranges throughout the Atlantic Ocean. NMFS delayed the effective date of the VMS requirement until October 1, 2000, in order to allow pelagic longline fishermen sufficient time to comply with the regulation. On September 26, 2000, the Washington, D.C. District Court requested additional information from NMFS regarding the fleet-wide application of VMS. NMFS seeks additional comments from the public on this issue before responding to the Court. Comments were accepted through February 8, 2001.

Observer Program

Four hundred and thirty longline sets were observed and recorded by NMFS observers in 1999 (4% coverage of a total of 11,045 sets reported). Table 4.1.4 compares observer coverage in past years for this fleet. The HMS Biological Opinion requires that 5 percent of the pelagic longline trips be selected for observer coverage for trips taken during 1999. In addition, ICCAT requires 5 percent observer coverage for all trips targeting yellowfin tuna and/or bigeye tuna. Unfortunately, due to logistical problems, it was not possible to place observers on all selected trips. NMFS is working towards improving compliance with observer requirements and facilitating communication between vessel operators and observer program coordinators. In addition, fishermen will be reminded of safety requirements for placement of observers, including the need to have all safety equipment on board that is required by the U.S. Coast Guard.

Table 4.1.4 Observer Coverage of the Pelagic Longline Fishery

Year	Number of Sets Recorded	Percentage of Total Number of Sets
1995	696	5.2
1996	361	2.5
1997	448	3.1
1998	287	2.9
1999	430	3.9

Marine Mammals

In accordance with the Marine Mammal Protection Act, NMFS published draft stock assessment reports for Atlantic and Gulf of Mexico marine mammals. These species are sometimes hooked on pelagic longline gear and fishermen report takes of mammals to NMFS in a marine mammal logbook. The Atlantic pelagic longline fishery is considered a Category I fishery under the Marine Mammal Protection Act (MMPA). In 1999 there were six observed takes of marine mammals by pelagic longlines. This number has been extrapolated out to an estimated 205 mammals fleet-wide. In addition to mammals released *dead* from fishing gear, which is uncommon in the pelagic longline fishery, NMFS must consider post-release mortality of mammals released *alive*.

The Atlantic Stock Recovery Group (SRG) recognized the need to immediately apply serious injury "guidelines" to the Atlantic pelagic longline fishery. At the April 1999 meeting, NMFS presented a preliminary analysis of the serious injuries in this fishery and gave a rough estimate of the number of injuries. Based on these levels of takes, the SRG recommended maintaining the Category I listing for the Atlantic pelagic longline fishery in the proposed List of Fisheries for 2000. NMFS will summarize the serious injury determinations for the pelagic longline fishery in the upcoming proposed List of Fisheries for 2001.

Sea Turtles

The Atlantic pelagic longline fishery exceeded the authorized level of takes of loggerhead sea turtles in 1999. As a result, NMFS re-initiated consultation under Section 7 of the Endangered Species Act. NMFS subsequently re-initiated consultation under the ESA to consider new information and analyses concerning turtle interactions with Atlantic pelagic longline gear. Nevertheless, an emergency rule to reduce bycatch was published October 13, 2000, (65 FR 60889) to avoid fishing in an area on the Grand Banks to minimize the number of turtle takes. In addition, all U.S.-flagged vessel with pelagic longline fishing gear onboard are required to have line clippers and a dip net that meet standards set forth in the emergency rule. A new Biological Opinion is expected in the Spring of 2001.

Sea Birds

Gannets, gulls, and storm petrels are occasionally hooked by Atlantic pelagic longlines. These species and all other sea birds are protected under the Migratory Bird Treaty Act; endangered sea birds receive further protection under the Endangered Species Act. Sea bird populations are often slow to recover from excess mortality as a consequence of their low reproductive potential (one egg per year and late sexual maturation). According to NMFS observer data from 1999, 1 seabird was hooked in June 1999 in the South Atlantic Bight. The species was not identified. The majority of longline interactions with sea birds occur as the gear is being set. The birds eat the bait and become hooked on the line; the line sinks and the birds are subsequently drowned.

The United States has developed a National Plan of Action in response to the FAO International Plan of Action to reduce incidental sea bird takes (www.nmfs.gov/NPOA-S.html). Although Atlantic pelagic longline interactions will be considered in the plan, NMFS has not identified a need to implement gear modifications aimed at reducing sea bird takes by Atlantic pelagic longlines. Takes of sea birds have been minimal in this fishery, most likely due to the setting of longlines at night and/or fishing in areas where birds are largely absent.

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At this time, direct use of observer data with pooling for estimating dead discards in this fishery represents the best scientific information available for use in the stock assessment. Direct use of observer data has been used for a number of years to estimate dead discards of a variety of species in longline fisheries, including billfish, sharks, undersized swordfish, and turtles, and it has been applied in both Atlantic and Pacific fisheries. Further, it has been used for scientific analyses by both ICCAT and the Inter-American Tropical Tuna Commission for a number of years.

NMFS is committed to seeking a review of the dead discard estimation methodology from an independent scientific panel. This panel would recommend the most appropriate fashion to evaluate the precision and accuracy of methods and assumptions needed to estimate dead discarded catches given current sampling levels for the range of species taken as bycatch and for determining compliance given the terms of the rebuilding program agreement. The results of this study will be reported to the ICCAT Advisory Committee and the U.S. Commissioners prior to their submission to ICCAT in 2001. NMFS will determine appropriate next steps at that time.

The total estimated metric tons of dead discards of swordfish, sailfish, blue marlin, and white marlin increased in 1999 over 1998 levels. The weight of pelagic, blue, dusky and hammerhead sharks discarded dead decreased while the weight of coastal and silky sharks increased (Cramer, pers. comm.). The most recent longline bycatch data are available from the 2000 U.S. National Report to ICCAT (NMFS, 2000a). Longline dead discards of swordfish in 1999 were estimated to be 449 mt ww, an increase of 57 mt from the 1998 level (U.S. National

Report, 2000).

Longline bycatch of billfish in 1999 in many geographic areas increased from 1998 levels. Estimated billfish dead discards from commercial longlines were 82.1 mt for blue marlin, 56.7 mt for white marlin, and 71.6 mt for sailfish in 1999. In 1998, 51.8 mt blue marlin, 32.1 mt white marlin, and 27.1 mt sailfish were reported as dead discards. Approximately three times as many blue marlin were discarded by longlines in the Gulf of Mexico in 1999 as in 1998. Bycatch of this species decreased from 1998 to 1999 in most other areas. White marlin bycatch increased substantially from 1998 to 1999 in the Gulf of Mexico and Caribbean Sea. Sailfish bycatch likewise increased substantially in the Gulf of Mexico in 1999.

Bluefin tuna dead discards from the pelagic longline fishery were 30-151 mt in 1999, depending on the methodology used for estimation, and 64 mt in 1998. A June closure of an area off the New Jersey coast was implemented in 1999 to reduce discards of bluefin tuna in the pelagic longline fishery (54.8 mt coastwide in 1998 and 30.7 mt in 1997). This closure was expected to reduce discards by approximately 55 percent in the northwest Atlantic.

4.1.5 Safety Issues Associated with the Fishery

Like all offshore fisheries, pelagic longlining can be dangerous. Trips can be of long duration, the work can be arduous, and the nature of setting and hauling the line may cause injuries due to hooking. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. NMFS does not wish to exacerbate unsafe conditions through implementation of regulations. Therefore, NMFS considers safety factors when implementing management measures on pelagic longline fishermen. For example, all time/area closures are expected to be closed to fishing, not transiting, in order to allow fishermen to make a direct route to and from fishing grounds. VMS is also likely to improve safety concerns not only because of the Emergency Position Indicating Radiobeacon (EPIRB) abilities of the system, but because regulations can now be adjusted given the enforcement backup of the vessel monitoring system. NMFS seeks comments from fishermen on any safety concerns they may have. Fishermen have pointed out that due to decreasing profit margins, they may fish with less crew or less experienced crew or may not have the time or money to complete necessary maintenance tasks. NMFS encourages fishermen to be responsible in fishing and maintenance activities.

4.2 Fishery Data: PURSE SEINE

4.2.1 Overview of History and Current Management

Domestic aspects of the Atlantic tunas purse seine fisheries are described in Section 2.2.3 of the HMS FMP. Social and economic aspects of the fisheries are described in Section 2.2.4.

Vessels using purse seine nets have participated in the U.S. fishery for bluefin tuna continuously since the 1950s, although a number of purse seine vessels did target and land bluefin tuna off the coast of Gloucester, MA as early as the 1930s. The limited entry system with non-transferable individual vessel quotas (IVQs) for purse seining was established in 1982, effectively excluding any new entrants to this category. Equal quotas are assigned to individual vessels by regulation; the IVQ system is possible given the small pool of ownership in this sector of the fishery. Currently, only five vessels comprise the bluefin tuna Purse Seine fleet and the quotas were made transferable among the five vessels in 1996.

The HMS FMP and its final implementing regulations established percentage quota shares for bluefin tuna for each of the domestic fishing categories. For the Purse Seine category, NMFS adopted a cap on the amount of quota the category could be allocated. The HMS AP met in Silver Spring, MD on June 10 and June 11, 1999, and discussed, among other issues, the Purse Seine category cap. The AP provided information and advice to NMFS on the issue of fairness in the context of allocation to the Purse Seine category.

On August 18, 1999 (64 FR 44885), NMFS published a proposed rule to remove the 250 mt cap on the Purse Seine category bluefin tuna allocation. NMFS held two public hearings on the proposed rule and the comment period closed on September 27, 1999. Numerous comments were received, both in favor of the proposed rule and against it. On October 27, 1999, NMFS filed a final rule with the Federal Register (64 FR 58793, November 1, 1999) removing the cap on the Purse Seine category.

4.2.2 Most Recent Catch and Landings Data

Table 4.2.1 shows purse seine landings of Atlantic tunas from 1995 through 1999. Purse Seine landings make up about 20% of the total annual U.S. landings of bluefin tuna (about 25% of total commercial landings), but account for only a small percentage, if any, of the landings of other HMS. In the 1980's and early 1990's, however, purse seine landings of yellowfin tuna were often over several hundred metric tons. Over 4,000 mt of yellowfin were recorded landed in 1985.

Table 4.2.1 Domestic Atlantic Tuna Landings for the Purse Seine Fishery: 1995-1999 (mt ww). NW Atlantic Fishing Area. Sources: NMFS, 1999 and 2000a.

Species	1995	1996	1997	1998	1999
Bluefin Tuna	249.0	245.0	249.7	248.6	247.9
Yellowfin Tuna	0	6.8	0	0	0
Skipjack Tuna	0	0.7	0	0	0

4.2.3 U.S. vs. International Catch

The U.S. purse seine fleet has historically accounted for a small percentage of total Atlantic landings. Over the past five years, the U.S. purse seine fishery has contributed to less than 0.15% of the total purse seine landings reported to ICCAT.

Table 4.1.2 Estimated International Purse Seine Atlantic Tuna Landings in the Atlantic and Mediterranean: 1995-1999 (mt ww). Source: NMFS, 1999 and 2000a .

Species	1995	1996	1997	1998	1999
Bluefin Tuna	24,295	26,589	25,256	20,957	15,030
Yellowfin Tuna	94,621	104,847	93,448	100,449	83,080
Skipjack Tuna	110,212	98,773	78,722	81,816	97,254
Bigeye Tuna	25,583	27,030	18,124	18,446	20,512
Total	254,711	257,239	215,550	211,668	215,876
US Total	249	252.5	249.7	248.6	247.9
US Percentage	0.10%	0.10%	0.12%	0.11%	0.11%

At the 1999 ICCAT meeting, the Commission agreed to continue the implementation of an area in the Gulf of Guinea closed to the use of Fish Aggregation Devices (FADs). The closure (which became mandatory in mid-1999) was in response to concern over catches of juvenile and undersize tunas by purse seiners relying on FADs. At its 2000 meeting, the SCRS evaluated the success of the closure. Although the closure only became mandatory in mid-1999, the SCRS evaluation showed that the regulation appears effective in reducing fishing mortality juvenile bigeye tuna, at least for the purse seine fishery. For juvenile yellowfin tuna, for which the closure was not designed, the impacts on mortality were not as evident. The closure was designed more to reduce/limit mortality on juvenile bigeye, and was implemented for November through January. Juvenile yellowfin are caught at a different time of year (March-April) relative to bigeye. At its

2000 meeting, ICCAT did not take any further action to modify the time/area closure, which will continue into the future.

4.2.4 Bycatch Issues and Data Associated with the Fishery

The Atlantic bluefin tuna Purse Seine category fishery is currently listed as a Category III fishery under the Marine Mammal Protection Act. After a school of fish is located, a Purse Seine net is set by paying out the net in a circle around the school. This affords considerable control over what is encircled by the net and the net does not remain in the water for any considerable amount of time. Therefore, this gear-type is not likely to result in mortality or serious injury of marine mammals or sea turtles. As a result, it is NMFS' biological opinion that the continued operation of the purse seine fishery may adversely affect, but is not likely to jeopardize, the continued existence of any endangered or threatened species under NMFS jurisdiction.

This fishery was observed in 1996, with near-100% coverage. Six pilot whales, one humpback whale, and one minke whale were observed as encircled by the nets during the fishery. All were released alive or dove under the nets and escaped before being pursed.

About mid-way through the 2000 bluefin tuna purse seine fishing season, large concentrations of bluefin tuna were located in one of the areas of Georges Bank that has been closed to all fishing gears in order to provide protection and rebuilding of northeast multispecies stocks, particularly for cod, haddock, and yellowtail flounder.¹ As tuna purse seine gear was not permitted to be used in the closed areas, the purse seine fleet could not access these fish, which were behaving in a manner conducive to purse seine operations (spending time very close to the surface). Purse seine vessels have traditionally fished in or near the closed area, most often to the west, near the "BB" buoy. The 1996 observer data showed minimal interaction with demersal species, and in an effort to gather information on the interaction of tuna purse seine gear with demersal species, and to allow the purse seine fleet to utilize their allocated quota of bluefin tuna and avoid conflicts with other gear types, NMFS issued Experimental Fishing Permits to the purse seine fleet, and placed observers on the vessels. This allowed the purse seine vessels to fish in the closed area and successfully prosecute the tuna fishery, and provided NMFS with additional data on purse seine operations and gear interactions. The data collected by the observers in 2000 will be analyzed and available in 2001.

4.2.5 Safety Issues Associated with the Fishery

There are no new safety issues associated with the U.S. Atlantic tunas purse seine fishery. Section 3.9 of the HMS FMP describes safety of human life at sea as it pertains to the fisheries for Atlantic HMS.

¹Since the implementation of the closed areas in 1994, only lobster and hagfish pot gear, ocean quahog and surf clam dredge gear, pelagic longline and hook and line, midwater trawls and recently scallop dredge gear on a limited basis, have been allowed in the closed areas.

4.3 Fishery Data: COMMERCIAL HANDGEAR

Handgear are used for Atlantic HMS by fishermen on private vessels, charter vessels, and headboat vessels. Operations, frequency and duration of trips, and distance ventured offshore vary widely. An overview of the history of the HMS handgear fishery (commercial and recreational) can be found in Section 2.5.8 of the HMS FMP.

The proportion of domestic HMS landings harvested with handgear varies by species, with Atlantic tunas comprising the majority of commercial landings. Commercial handgear landings of all Atlantic HMS (other than sharks) in the United States are shown in Table 4.3.1. The fishery is most active during the summer and fall, although in the South Atlantic and Gulf of Mexico fishing occurs during the winter months. For bluefin tuna, commercial handgear landings accounted for approximately 60% of total U.S. bluefin tuna landings, and over 71% of commercial bluefin landings. The commercial handgear fishery for bluefin tuna occurs mainly in New England, with vessels targeting large medium and giant bluefin using rod and reel, handline, harpoon, and bandit gear. Beyond these general patterns, the availability of bluefin tuna at a specific location and time is highly dependent on environmental variables that fluctuate from year to year. Fishing usually takes place between eight and 200 km from shore using bait including mackerel, whiting, mullet, ballyhoo, herring, and squid.

The majority of U.S. commercial handgear (rod and reel, handline, and bandit gear) fishing activities for bigeye, albacore, yellowfin, and skipjack tunas take place in the northwest Atlantic. Rod and reel gear is also used by recreational fishermen, which is addressed in Section 4.4. In 1998, 4.3 percent of the total yellowfin catch, or 9.0 percent of the commercial yellowfin catch, was attributable to commercial handgear. The majority of these landings occurred in the northwest Atlantic Ocean. Commercial handgear landings of skipjack tuna accounted for less than one percent of total skipjack landings, or about 2.1 percent of commercial skipjack landings. The percentages of albacore are similar to those for skipjack, and handgear landings of bigeye tuna accounted for less than one percent of total and commercial bigeye landings.

Swordfish are landed using harpoons and/or handlines. While commercial handgear is periodically used by New England fishermen, fishermen in the southeast may increase their handgear landings as the swordfish stock increases. Handgear landings of swordfish are shown in Table 4.3.1 and account for a very small percentage of total U.S. swordfish catch (less than 0.1%).

The HMS FMP established a limited access program for the commercial swordfish and shark fisheries (all gears), as well as for tunas (longline only). Fishermen who submitted an application by December 1, 1999, with documentation of a swordfish permit for use with harpoon gear or landings of swordfish with handgear as evidenced by logbook records, verifiable sales slips or receipts from registered dealers, or state landings records were eligible for a swordfish handgear permit. NMFS also issued handgear permits to those applicants who met the earned

income requirement, i.e., those who had derived more than 50% of their earned income from commercial fishing through the harvest and first sale of fish or from charter/headboat fishing, or those who had gross sales of fish greater than \$20,000 harvested from their vessel, during one of the three calendar years preceding the application. Chapter 4 of the HMS FMP includes a complete description of the handgear permit for swordfish under the limited access system. See Chapter Nine of this document for further information on permitting, including limited access permits.

There are a significant number of sharks landed by fishermen using commercial handgear. However, the nature of the data collected and assessed for Atlantic sharks does not readily allow a breakdown into various commercial gear types. Anecdotal evidence suggests that many charter and headboat captains target sharks as an alternative when other species are unavailable. The Sutton and Ditton study on the Gulf charter/party boat industry (discussed further in Section 4.3.5) indicate that 65% of party boat operators targeted sharks at least once during the study period. Further information on Atlantic sharks catch and landings data is found in Section 4.5.

4.3.1 Overview of History and Current Management

A thorough description of the commercial handgear fisheries for Atlantic tunas can be found in Section 2.2.3 of the HMS FMP. Social and economic aspects of the domestic handgear fisheries are described in section 2.2.4 of the HMS FMP and later in this document (Section 5). For bluefin tuna, information regarding Prices and Markets, Costs and Expenses in the Commercial Fishery, Exports and Imports, Processing and Trade, Charter/Headboat Fishing, and Recreational Fishing can be found in Section 2.2.4.1. Section 2.2.4.2 details Commercial Fishing, Charter/Headboat Fishing, and Recreational Fishing for BAYS tunas.

The domestic swordfish fisheries are discussed in Section 2.3.3 of the FMP. Social and economic aspects of the domestic handgear fisheries are described in Section 2.3.4, and later in this document.

The domestic shark fisheries are discussed in Section 2.4.3 of the FMP. Directed fisheries for Atlantic sharks are conducted by vessels using bottom longline, gillnet, and rod and reel gear and discussed in Section 4.5 of this report. Social and economic aspects of the domestic handgear fisheries are described in Section 2.4.4 of the FMP, as well as in Section 5 of this document.

4.3.2 Most Recent Catch and Landings Data

Updated tables of landings for the commercial handgear fisheries by gear and by area for 1995-1998 are presented in Tables 4.3.1 and 4.3.2. As commercial shark landings are not recorded/disaggregated by gear type, no commercial handgear data is provided in this section. A complete discussion of Atlantic sharks is found in Section 4.5. In the HMS FMP, domestic landings of Atlantic bluefin tuna (1983 through 1997) and BAYS tunas (1995 through 1997) are

presented in Section 2.2.3, and domestic catches (landings and discards) are presented in Section 2.3.3. As the majority of U.S. landings of yellowfin tuna are by rod and reel, a summary of the recently published total domestic recreational and commercial yellowfin landings (1981-1998) is presented in this section.

Table 4.3.1 Domestic Landings for the Commercial Handgear Fishery, by Species and Gear, for 1996-1999 (mt ww). Sources: NMFS, 1999 and 2000a.

Species	Gear	1996	1997	1998	
Bluefin Tuna	Rod and Reel	504.1	617.8	603.4	643.6
	Handline	32.5	17.4	29.2	16.4
	Harpoon	95.7	97.5	133.4	114.4
	TOTAL	632.3	732.7	766.0	774.4
Bigeye Tuna	Troll	4.1	3.9	4.0	0
	Handline	17.3	2.7	0.1	12.3
	TOTAL	21.4	6.6	4.1	12.3
Albacore Tuna	Troll	2.7	5.2	5.8	0
	Handline	3.8	4.8	0	4.4
	TOTAL	6.5	10.0	5.8	4.4
Yellowfin Tuna	Troll	371.0	237.6	177.5	0
	Handline	84.2	90.6	64.7	219.2
	TOTAL	455.2	328.2	242.2	219.2
Skipjack Tuna	Troll	0.9	7.9	0.4	0
	Handline	0.4	0.1	0	6.6
	TOTAL	1.3	8.0	0.4	6.6
Swordfish	Troll	7.3	0.4	0.7	0
	Handline	0.1	1.3	0	5.0
	Harpoon	0.5	0.7	1.5	0
	TOTAL	7.9	2.4	2.2	5.0

Table 4.3.2 Domestic Landings for the Commercial Handgear Fishery by Species and Region for 1996-1999 (mt ww). Sources: NMFS, 1999 and 2000a.

Species	Region	1996	1997	1998	1999
Bluefin Tuna	NW Atl	632.3	732.7	766.0	774.4
Bigeye Tuna	NW Atl	20.5	6.6	4.0	11.9
	GOM	0.9	0	0.1	0.2
	Carib	0	0	0	0.2
Albacore Tuna	NW Atl	6.4	6.4	5.8	0.6
	GOM	0.1	0	0	≤ .05
	Carib	0	3.6	0	3.8
Yellowfin Tuna	NW Atl	408.2	252.3	177.5	192.0
	GOM	47.0	55.6	60.8	12.7
	Carib	0	20.3	3.9	14.5
Skipjack Tuna	NW Atl	1.2	0.7	0.4	0.2
	GOM	0.1	0	0	0.4
	Carib	0	7.3	0	5.8
Swordfish	NW Atl	7.9	2.4	2.2	5.0
	GOM	0	0	0	≤ .05

Handgear Trip Estimates

Tables 4.3.3a and 4.3.3.b displays the estimated number of rod and reel and handline trips targeting large pelagic species in 1999 and 2000. The trips include commercial and recreational trips, and are not specific to any particular species. One can assume that most trips in MA, NH, and ME were targeting bluefin tuna, and that most of these trips were commercial, as over 90 percent of Atlantic tunas vessel permit holders in these states have commercial General category tuna permits. For the other states, the majority of the trips are recreational (in that fish are not sold), with the predominant targeted species consisting of yellowfin tuna and sharks. The drop in the number of trips from 1999 to 2000 may be a result of less availability of tuna in near-shore fishing grounds. It should be noted that the 2000 estimates are still preliminary and subject to change.

Table 4.3.3a **Estimated total trips targeting large pelagic species from June 7 through November 7, 1999.**
Source: LPS telephone and dockside interviews. Estimates are from 1999 Large Pelagics Survey Program Documentation (December 1999).

State/Area	Private Vessel Trips	Charter Trips	
VA	2,522	885	3,407
MD/DE	4,517	1,376	5,893
NJ	4,849	1,286	6,135
NY	3,037	838	3,875
CT/RI	2,804	414	3,218
MA	7,562	832	8,394
NH/ME	3,452	366	3,818
Total	28,742	5,998	34,740

Table 4.3.3b **Estimated total trips targeting large pelagic species from June 5 through November 5, 2000**
Source: LPS telephone and dockside interviews. Estimates are preliminary (November 2000).

State/Area	Private Vessel Trips	Charter Trips	Total
VA	930	198	1,128
MD/DE	1,008	915	1,923
NJ	2,934	1,279	4,213
NY	1,093	468	1,561
CT/RI	1,096	372	1,468
MA	6,390	1,108	7,498
NH/ME	1,221	233	1,454
Total	14,672	4,573	19,245

4.3.3 U.S. vs. International Catch

SCRS data do not lend themselves to organize international landings into a commercial handgear category. While some countries report rod and reel landings, these numbers may include both commercial and recreational landings. International catches of all Atlantic HMS for 1999 are summarized in Table 4.1.

4.3.4 Bycatch Issues and Data Associated with the Fishery

As compared with other commercial gear types, commercial handgear produces relatively

lower levels of bycatch. However, bycatch in the yellowfin tuna commercial handgear fishery is unmonitored in those areas where commercial activities occur after the Large Pelagic Survey (LPS) sampling season. Rod and reel discards of HMS as assessed from LPS data are discussed in the Recreational Section (4.4.4) as are new efforts in documenting catch and release survival rates. At this time, however, there is little information regarding important interactions and new data relating to commercial handgear bycatch. Anecdotal reports suggest that there may be an issue of small bluefin, yellowfin, and bigeye tuna discards, but there is no supporting documentation at this point. Some regulatory discards occur because fishermen must comply with minimum size restrictions.

4.3.5 Safety Issues Associated with the Fishery

Section 3.9 of the HMS FMP describes safety of human life at sea as it pertains to the fisheries for Atlantic HMS. Additional safety information regarding the commercial handgear fisheries for Atlantic HMS is presented below.

The United States Coast Guard (USCG) conducts routine vessel safety inspections at sea on a variety of vessels throughout the year, and during the busy fall General category bluefin tuna season the USCG concentrated patrol activities on General category bluefin tuna boats and followed the fleet south of Cape Cod. Boarding officers indicate that the majority of General category vessels have the necessary safety equipment; however, many part-time fishermen operating smaller vessels do not meet the necessary safety standards. In the fall of 1999, three vessels participating in the Atlantic bluefin tuna General category capsized off Chatham, Massachusetts. Two of the vessels capsized due to weight while attempting to boat commercial-sized bluefin tuna (measuring 73 inches or greater and weighing several hundred pounds). The third vessel capsized while under tow by another vessel. Through November of 2000, there have not been any similar incidents in 2000 involving participants in the General category fishery.

Currently, NMFS does not require proof of proper safety equipment as a condition to obtain an Atlantic tunas permit. Instead, NMFS informs permit applicants that commercial vessels are subject to the Fishing Vessel Safety Act of 1988 and advises them to contact their local USCG office for further information. The USCG District Boston office reports receiving 50 to 75 calls a week during the peak fishing season; officers speak with all callers to answer vessel questions.

Since NMFS regulations do not require USCG inspection or safety equipment in order to obtain a General category permit, NMFS cannot be certain that all participants in the commercial bluefin fishery are adequately prepared for the conditions they may encounter. NMFS is concerned about the safety of all vessels participating in the General category and is working with the USCG to improve communication of vessel safety requirements to General category vessel operators.

It is unlawful for Atlantic tunas vessels to engage in fishing unless the vessel travels to and from the area where it will be fishing under its own power and the person operating that vessel brings any bluefin tuna under control (secured to the catching vessel or on board) with no assistance from another vessel, except when shown by the operator that the safety of the vessel or its crew was jeopardized or other circumstances existed that were beyond the control of the operator. NMFS Enforcement and USCG boarding officers have recently encountered vessels participating in the bluefin tuna fishery that are unable to transit to and from the fishing grounds due to their limited fuel capacity. Occasionally these smaller vessels will work in cooperation with a larger documented vessel to catch a bluefin; others have been observed to leave lifesaving equipment at the dock to make room for extra fuel, bait, and staples. NMFS is concerned that use of such inadequately-equipped vessels jeopardizes crew in that the vessel may not be able to safely return to shore without assistance of the larger vessel due to insufficient fuel or to adverse weather conditions.

In 1999 and 2000, the USCG focused boardings on small vessels, especially those owned by “part-time” commercial bluefin fishermen, and terminated several dozen trips due to the lack of safety equipment on board. If a vessel is boarded at sea and found to be lacking major survival equipment, the USCG will terminate the trip and escort the vessels back to the dock.

NMFS has received comments from some General category participants that effort controls, particularly restricted-fishing days (RFDs), allow fishermen to rest and to make needed vessel repairs, and therefore improve safety. There is a perception by many General category participants that every open day must be fished. The issue of effort controls alleviating fatigue problems was discussed in the FMP, but vessel repairs were not. NMFS also continues to receive comments, as discussed in the FMP, that indicate that RFDs may encourage fishermen to fish in conditions which they generally would avoid on open days, and that a season without RFDs would allow fishermen to choose their own schedule of fishing days, thus alleviating derby conditions and safety concerns.

NMFS will consider all safety comments and information, including those from the USCG and NMFS Enforcement, when planning future General category effort control schedules and will discuss these issues in future meetings with the AP.

4.4 Fishery Data: RECREATIONAL HANDGEAR

The HMS Handgear (rod and reel, handline, and harpoon) fishery includes both commercial and recreational fishermen and is described in Section 2.5.8 of the HMS FMP. The recreational billfish fishery is described in section 2.1.3 the Billfish Amendment; commercial sale, barter or trade of Atlantic billfish by U.S. commercial interests is prohibited. This section of the SAFE report describes the recreational portion of the handgear fishery, primarily as related to rod and reel fishing. Commercial handgear fisheries for HMS are discussed separately in Section 4.3 of this report.

4.4.1 Overview of History and Current Management

Atlantic tunas, swordfish, and sharks are managed under the HMS FMP, while Atlantic billfish are managed separately under the Billfish Amendment. The history of Atlantic billfish management is reviewed in Section 1.1.1 of the Billfish Amendment. Summaries of the domestic aspects of the Atlantic tuna fishery, the Atlantic swordfish fishery, and the Atlantic shark fishery are found in Sections 2.2.3, 2.3.3, and 2.4.3, respectively, of the HMS FMP.

Atlantic tunas, sharks, and billfish are all targeted by recreational fishermen using rod and reel gear. Atlantic swordfish are also targeted and, although this fishery had declined dramatically over the past twenty years, recent anecdotal reports suggest that a recreational swordfish fishery may be growing in the Mid-Atlantic Bight and off the East Coast of Florida. Recreational fishing for Atlantic HMS is managed primarily through the use of minimum sizes and bag limits. Recreational tuna fishing regulations are the most complex and include a combination of minimum sizes, bag limits, limited seasons based quota allotment for bluefin tuna, and reporting requirements depending on the particular species and vessel type. Atlantic tunas are the only HMS species group that require a permit for recreational fishing at this time. Bluefin tuna are the only HMS species managed under a recreational quota for which the fishing season closes after the quota has been met. While Atlantic marlin have associated landing caps (a maximum amount of fish that can be landed), the overall strategy for management of recreational billfish fisheries is based on use of minimum size limits. The recreational fishery for swordfish is also managed through a minimum size requirement. The recreational shark fishery is managed through bag limits, minimum size requirements, and landing requirements (sharks must be landed with heads and fins attached). Additionally, the possession of 19 species of sharks is prohibited.

In 1997, ICCAT made several recommendations to recover billfish resources throughout the Atlantic Ocean, including reduction of Atlantic BUM and WHM landings by at least 25 percent from 1996 levels, starting in 1998, to be accomplished by 1999; promote the voluntary release of live Atlantic BUM and WHM; and work to improve current monitoring, data collection and reporting in all Atlantic billfish fisheries. A 1998 ICCAT recommendation continued the requirement for a reduced level of marlin landings through 2000. Because commercial landings of Atlantic billfish by U.S.-flagged vessels were prohibited by the 1988 Atlantic Billfish FMP, the 25

percent reduction in blue and white marlin landings affects only recreational anglers in the United States. In November, 2000, ICCAT made a third recommendation for BUM and WHM by developing a two-phase rebuilding program. See Section 2.4.3 for more information related to the rebuilding program.

4.4.2 Most Recent Catch and Landings Data

The recreational landings databases for HMS consists of data obtained through surveys including the Marine Recreational Fishery Statistics Survey (MRFSS), Large Pelagic Survey (LPS), Southeast Headboat survey (HBS), Texas Headboat survey, and the Recreational Billfish Survey tournament data (RBS). Descriptions of these surveys, the geographic areas they include, and their limitations, are discussed in both the HMS FMP and the Billfish Amendment in Sections 2.6.2 and 2.3.2, respectively.

Reported domestic landings of Atlantic bluefin tuna (1983 through 1998) and BAYS tuna (1995 through 1997) are presented in Section 2.2.3 of the HMS FMP. As landings figures for 1997 and 1998 were preliminary in the HMS FMP, updated tables of landings for these recreational rod and reel fisheries in 1996-1999 are presented below with updates of other HMS species. Recreational landings of swordfish are monitored by the LPS and the MRFSS. However, because swordfish landings are considered rare events, it is difficult to extrapolate the total recreational landings from dockside intercepts.

Table 4.4.1 Updated Domestic Landings for the Atlantic Tunas, Swordfish and Billfish Recreational Rod and Reel Fishery: Calendar years 1996-1999 (mt ww)*. Sources: NMFS, 1999 and 2000a, Large Pelagic Survey, SEFSC Recreational Billfish Survey. (Recreational shark landings are provided in Tables 4.2.2 and 4.2.3).

Species	Region	1996	1997	1998	
Bluefin tuna**	NW Atlantic	362	299	184	99.9
	GOM	0	0	0	0.4
	Total	362	299	184	100.3
Bigeye tuna	NW Atlantic	108.2	333.5	228.0	316.1
	GOM	0	0	0	1.8
	Total	108.2	333.5	228.0	317.9
Albacore	NW Atlantic	277.8	269.5	601.1	90.1
	GOM	61.7	65.2	0	0
	Total	339.5	334.7	601.1	90.1

Yellowfin tuna	NW Atlantic	4,484.8	3,560.9	2,845.7	3,818.2
Species	Region	1996	1997	1998	1999
	GOM	13.2	7.7	80.9	149.4
	Total	4,498	3,569	2,927	3,967.6
Skipjack tuna	NW Atlantic	48.1	42.0	49.5	63.6
	GOM	36.4	21.7	37.0	34.8
	Total	84.5	63.7	86.5	98.4
Blue marlin***	NW Atlantic	17.0	25.0	34.1	24.8
	GOM	8.3	11.5	4.5	7.5
	Caribbean	9.6	8.6	10.6	4.6
	Total	34.9	45.1	49.2	36.9
White marlin***	NW Atlantic	2.7	0.9	2.4	1.5
	GOM	0.6	0.9	0.2	0.1
	Caribbean	0.0	0.0	0.02	0
	Total	3.3	1.8	2.6	1.6
Sailfish***	NW Atlantic	0.2	0	0.1	0.07
	GOM	0.8	0.4	1.0	0.6
	Caribbean	0.2	0.2	0.05	0
	Total	1.2	0.6	1.15	0.67
Swordfish	Total	5.9	10.9	4.7	21.32

* Rod and reel catches and landings for Atlantic tunas represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

**Rod and Reel catch estimates for bluefin tuna in the U.S. National Report to ICCAT include both recreational and commercial landings. Rod and reel catch of bluefin less than 73" curved fork length (CFL) are recreational, and rod and reel catch of bluefin 73 inches CFL or greater are commercial. Rod and reel catch of bluefin > 73" CFL also includes a few metric tons of "trophy" bluefin (recreational bluefin 73").

***Blue marlin, white marlin, and sailfish landings are estimated based on the SEFSC Recreational Billfish Survey and the Large Pelagic Survey.

Atlantic Billfish Recreational Fishing

As part of the 2000 SCRS assessment of Atlantic blue marlin and Atlantic white marlin stocks (see Section 2 of this report), several scientific papers were presented by the SEFSC

relating to recreational landings of billfish by U.S. anglers. Document SCRS/00/055 reviewed the 1997 ICCAT Commission recommendation that, beginning in 1998, all parties reduce "blue marlin and white marlin landings by at least 25% for each species from 1996 landings, such reduction be accomplished by the end of 1999." This Commission recommendation was based on the SCRS recommendation "that reductions in fishing mortality are necessary to avoid further declines in the stocks and to begin rebuilding these stocks." An evaluation is presented comparing the U.S. blue marlin rod and reel catches in 1999 with 1996, updating the 1998 versus 1996 preliminary comparison (SCRS/99/99). The results of the evaluation presented indicate that in order to achieve a 25% reduction by weight in blue marlin rod and reel landings in year 2000, relative to 1996 landings using minimum size, the minimum size for this species would likely have to be increased to above the current 99 inch lower jaw fork length limit. Higher minima would have greater chances of achieving this implementation for the entire fishing year, and some buffer against further increases in the average size of available blue marlin in 2000 and beyond relative to those available in 1996.

Document SCRS/00/57 noted that some components of the U.S. recreational marlin landings are not precisely measured and have not been routinely included in the landings reported to ICCAT. This is reflected by the caveat that these reported landings are "minimum estimates." This paper explores the possible integration of the U.S. Marine Recreational fishery Statistics Survey (MRFSS) catch estimates and the U.S. Atlantic Recreational Billfish Survey (RBS). The resulting model attempts to estimate total U.S. recreational marlin landings by adjusting for the bias in the relatively precise annual RBS estimates. The bias correction was based on regressions of relatively unbiased, but highly imprecise, MRFSS estimates on the RBS estimates. The resulting models were used to predict the U.S. recreational landings of Atlantic blue marlin and white marlin for 1981-1999.

Document SCRS/00/58 developed indices of abundance of blue marlin and white marlins from the U.S. recreational tournament and non-tournament fisheries for the period 1973-1999. The indices of abundance in numbers of fish and weight were estimated from numbers of billfish caught and reported to the Recreational Billfish Survey (RBS) program. The standardized indices were estimated using Generalized Linear Mixed Models under a delta lognormal model approach. Factors in the analysis included year, area, season and first-level interactions. The model analyzed the fishing success and effort of each day-location, weighted by the number of boat trips. Model selection, diagnostics and comparison with prior standardized series were presented.

Document SCRS/00/60 indicated that size frequencies of catches represent a useful adjunct to catch, effort and abundance information for stock assessment. Size frequencies of blue and white marlin (*Makaira nigricans*, and *Tetrapturus albidus*, respectively) have been collected at U.S. recreational tournaments since 1972. The U.S. Marine Recreational Fishing Statistics Survey (MRFSS), and Large Pelagic Survey have made limited additional observations of the U.S. recreational marlin catch during dockside interviews of fishermen since 1982 and 1984, respectively. Other size data for marlin are available for U.S. and Venezuelan longline fisheries.

These include measurements taken by observers on Venezuelan longline vessels since 1987, and on U.S. vessels since 1989. These data are supplemented with dockside samples of billfish landed in Venezuela beginning in 1987. Length frequencies constructed from these data showed increasing mean sizes in the recreational fisheries in recent years. This trend is the result of the implementation of minimum size regulations that truncated the size distribution of landed fish. This trend is not reflected in the samples from longline fisheries. Sex ratios for both species change from predominately male, or unknown sex at smaller sizes to predominantly female at larger sizes.

Swordfish Recreational Fishery

The recreational swordfish fishery in the North Atlantic Ocean has been expanding in recent years probably due to increased availability of small swordfish and increased interest in this sport. Fishermen typically fish off the east coast of Florida and off the coasts of New Jersey and New York. In the past, the New York fishery for swordfish has occurred incidental to overnight yellowfin tuna trips. During the day, fishermen targeted tunas, while at night they fished deeper for swordfish. This appears to have evolved into a directed fishery off Florida year-round and New Jersey in the summer months. The Florida fishery occurs at night when fishermen target swordfish using live bait, circle hooks, and lightsticks.

Existing survey strategies do not pick up landings of these fish which anecdotally appear to be frequent. Some hand gear swordfish fishermen have commercial permits², others land swordfish for personal consumption. NMFS is developing a strategy for sampling this fishery in order to accurately report recreational handgear-caught swordfish to ICCAT. These landings are counted against the Incidental quota.

Shark Recreational Fishery

Recreational landings of sharks are an important component of HMS fisheries. The following tables provides a summary of landing for each of the three species groups.

Table 4.4.2 Final Estimates of Total Recreational Harvest of Atlantic Sharks: 1995-1999 (numbers of fish in thousands). 1999 estimates are preliminary. Source: Cortes 2000.

Species Group	1995	1996	1997	1998	1999
LCS	176.3	188.5	165.1	169.8	83.9
Pelagic	32.5	21.6	8.7	11.8	11.1

²Access to the commercial swordfish fishery is limited; hand gear fishermen however may purchase permits from other permitted fishermen because the permits are transferable.

SCS	170.7	113.5	98.5	169.8	82.9
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Table 4.4.3 Recreational Harvest of Atlantic LCS by Species, in number of fish: 1997-1999. 1999 estimates are preliminary. Source: Cortes 2000.

LCS Species	1997	1998	
Basking**	none reported	none reported	none reported
Bignose*	none reported	none reported	none reported
Bigeye sand tiger**	none reported	none reported	none reported
Blacktip	70,963	82,310	30,961
Bull	857	1,745	2,832
Caribbean Reef*	none reported	none reported	none reported
Dusky*	13,426	4,499	5,186
Gallapagos*	none reported	none reported	none reported
Hammerhead, Great	381	494	346
Hammerhead, Scalloped	3,313	2,575	1,329
Hammerhead, Smooth	2,227	375	none reported
Hammerhead, Unclassified	473	389	75
Lemon	2,354	2,303	131
Night*	90	133	none reported
Nurse	7,937	2,455	1,489
Sandbar	41,618	35,766	18,882
Sand tiger**	1,474	none reported	none reported
Silky	122	5,376	3,834
Spinner	2,990	10,836	5,738
Tiger	69	1,380	146
Whale**	none reported	none reported	none reported
White**	none reported	none reported	none reported

LCS Species	1997	1998	1999
Large Coastal Unclassified	16,790	19,139	12,953
Total:	165,094	169,776	83,901

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

** indicates species that were prohibited as of April 1997.

Table 4.4.4 Recreational Harvest of Atlantic Pelagic sharks by Species, in number of fish: 1997-1999. 1999 estimates are preliminary. Source: Cortes 2000. Note: * indicates species that were prohibited in the recreational fishery as of July 1, 1999.

Pelagic Shark Species	1997	1998	1999
Bigeye thresher*	none reported	none reported	none reported
Bigeye sixgill*	none reported	none reported	none reported
Blue	4,236	6,085	5,218
Mako, Longfin*	none reported	none reported	none reported
Mako, Shortfin	3,025	5,633	1,383
Mako, Unclassified	10	8	none reported
Oceanic whitetip	none reported	none reported	none reported
Porbeagle	none reported	none reported	none reported
Sevengill*	none reported	none reported	none reported
Sixgill*	none reported	none reported	none reported
Thresher	1,472	36	4,512
Total:	8,743	11,762	11,113

Table 4.4.5 Recreational Harvest of Atlantic SCS by Species, in number of fish: 1997-1999. 1999 estimates are preliminary. Source: Cortes 2000. Note: * indicates species that were prohibited in the recreational fishery as of July 1, 1999.

SCS Species	1997	1998	
Atlantic Angel*	107	109	none reported
Blacknose	10,705	10,523	5,957
Bonnethead	15,307	29,692	36,664
Finetooth	4,763	139	69
Sharpnose, Atlantic	67,726	129,315	40,291
Sharpnose, Caribbean*	none reported	none reported	none reported
Smalltail*	none reported	none reported	none reported
Total:	98,501	169,779	82,891

4.4.3 U.S. vs. International Catch

Important fisheries including directed recreational fisheries of the United States, Venezuela, Bahamas, Brazil, and many other countries and entities in the Caribbean Sea and off of the west coast of Africa are responsible for significant HMS landings. Directed recreational fisheries for sailfish occur in the west Atlantic from the United States, Venezuela, Bahamas, Brazil, Dominican Republic, Mexico, and other countries in the Caribbean Sea. However, of these countries, the United States is the only country that reports recreational landings to ICCAT. Therefore, a comparison of the percentage of U.S. landings relative to recreational fisheries in other countries is not feasible. Further, total landings data are incomplete because many countries that reported landings in 1996 failed to report their 1998 and 1999 landings, which hampered the 2000 Atlantic marlin stock assessments as well.

As part of a 1997 SCRS survey, 12 ICCAT member countries as well as Chinese Taipei and Senegal provided information on the existence of, and level of data collection for, recreational and artisanal fisheries. Survey results indicated that Brazil, Canada, France, Italy, Morocco, UK, Bermuda, and the United States have recreational fisheries in the ICCAT area of concern. Levels of data collection varied widely from country to country, making any comparison of catch levels difficult and potentially inaccurate. The wide range of recreational catch across nations and species does warrant further exploration of potential data sources and the feasibility of increased monitoring.

At the 1999 ICCAT meeting in Rio de Janeiro, Brazil, the Commission adopted a resolution to improve the quantity and quality of recreational data collection. Recreational fisheries are to be discussed and assessed in each country's National Report beginning in the year 2000. In addition, the SCRS was called upon to examine the impact of recreational fishing on tuna and tuna-like species. At the time this report was prepared, no further information was available on international HMS recreational catches.

4.4.4 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen value the experience of fishing and may not be targeting a particular pelagic species. Recreational "marlin" or "tuna" trips may yield dolphin, tunas, wahoo, and other species, both undersized and legally sized. Bluefin trips may yield undersized bluefin or a seasonal closure may prevent landing of a bluefin tuna above the minimum size. In some cases, therefore, rod and reel catch may be discarded.

The Billfish Amendment established a catch-and-release fishery management program for the recreational Atlantic billfish fishery. As a result of this program, all Atlantic billfish that are released alive, regardless of size, are not considered bycatch. NMFS believes that establishing a

catch and release fishery in this situation will further solidify the existing catch-and-release ethic of recreational billfish fishermen, thereby increasing release rates of billfish caught in this fishery. The recreational white shark fishery is by regulation a catch-and-release fishery only and white sharks are not considered bycatch.

Bycatch can result in death or injury to discarded fish and bycatch mortality should be incorporated into fish stock assessments and evaluation of management measures. Rod and reel estimates from Virginia to Maine during June through October can be monitored through expanding survey data derived from the Large Pelagic Survey (dockside and telephone surveys). Actual numbers of fish discarded for many species are so low that presenting these data by area may be misleading, particularly if estimates are expanded for unreported effort in the future. The HMS FMP presented the “raw” data for bycatch species in the rod and reel fishery from the 1997 LPS database in summary format (for all areas) in Table 3.38. This table is updated below to included preliminary 1999 data.

Table 4.4.6 Reported Discards* of HMS in the Rod and Reel Fishery. Source: Large Pelagic Survey (LPS) Preliminary Data.

Species	Number of Fish Kept					
	1997	1998	1999	1997	1998	
White Marlin**	7	11	6	203	465	156
Blue Marlin**	2	3	3	30	27	28
Sailfish**	0	1	0	2	2	3
Swordfish	5	1	3	6	5	1
Bluefin Tuna	749	653	396	1,181	1,105	327
Bigeye Tuna	17	17	27	6	9	0
Yellowfin Tuna	1,632	2646	2,501	224	645	682
Skipjack Tuna	285	261	146	468	267	88
Albacore Tuna	189	558	133	43	92	52
Thresher Shark	3	7	3	2	2	2
Mako Shark	51	78	49	86	92	49
Sandbar Shark	5	2	2	30	56	6
Dusky Shark	16	6	1	50	54	7
Tiger Shark	0	2	0	5	5	0

Blue Shark	68	26	11	1,897	780	572
Hammerhead Shark	1	1	1	4	4	5
Wahoo	6	71	45	1	2	0
Species	Number of Fish Kept			Number of Fish Discarded Alive		
	1997	1998	1999	1997	1998	1999
Dolphinfish	920	7263	2,139	61	194	73
King Mackerel	174	198	141	1	10	8
Atlantic Bonito	336	328	254	203	300	166
Little Tunny	587	1231	97	1,015	1507	133
Amberjack	3	6	9	18	40	24

*NMFS typically expands these “raw” data to report discards of bluefin tuna by the rod and reel fishery to ICCAT. If sample sizes are large enough to make reasonable discard estimates for other species, NMFS may estimate discard estimates of other bycatch species in future SAFE reports.

**Amendment One to the Atlantic Billfish FMP established billfish released in the recreational fishery as a “catch and release” program, thereby exempting these fish from bycatch considerations

Outreach programs were included as final actions in the HMS FMP and the Billfish Amendment as part of the management measures to address bycatch. These programs have not yet been implemented, but preparation of program designs are currently in progress. One of the key elements of the outreach program will be to provide information that leads to an improvement in post-release survival from both commercial and recreational gear.

Section 3.5.2.2 in the Billfish Amendment includes a review of available information on post-release mortality. Table 3.5.3 of the Billfish Amendment and Table 3.40 of the HMS FMP list the existing studies, their methods, and conclusions. Approximately 90%, or greater, of blue and white marlin taken by U.S. recreational fishermen are released after capture, therefore, studies on post-release mortality are critical.

A study on the impact of circle and straight hooks was completed this year by G. B. Skomal and B.C. Chase of the Massachusetts Division of Marine Fisheries together with Dr. E. Prince of the SEFSC of NMFS. The objectives of their research were to compare the performance of circle hooks to straight hooks relative to hooking location, damage, and success in bait fisheries for bluefin tuna. Based on the capture of 101 school-sized bluefin tuna, they determined that 94% caught with circle hooks were hooked in the jaw, while 52% caught with straight hooks were hooked in the jaw and 34% hooked in the pharynx or esophagus. The estimated release mortality was 4% from circle hooks and 28% from straight hook captures. They also noted that while the ability of each hook type to hook and hold tuna was not the same, the overall catching success was similar. The straight hooks tend to hold fish more readily, but

the circle hooks do not pull out once the fish is hooked. Therefore, they concluded that circle hooks can be an effective conservation tool in bait fisheries for juvenile bluefin tuna.

In a study conducted in Iztapa, Guatemala by Dr. E. Prince, M. Ortiz and A. Venizelos of the SEFSC in Miami, FL, a total of 360 Pacific sailfish were caught to assess terminal gear performance: 235 sailfish were caught on circle hooks and 125 on “J” hooks. Circle hooks used on sailfish hooked 1.14 times more fish compared to “J” hooks; no difference was noted in the catch percentage (fish caught/fish hooked) between hook types. Significantly more sailfish were hooked in the corner of the mouth using circle hooks (85% vs. 27%), while fish were more likely to be hooked in the stomach or throat using “J” hooks (46% vs. 2%). Sailfish caught on “J” hooks were approximately 21 times more likely to suffer hook-related bleeding than those caught on circle hooks. Further research was conducted on 75 Atlantic sailfish caught in the south Florida live bait recreational fishery, comparing the hooking performance of circle hooks with and without an offset point. The results of this work indicated that use of circle hooks with hook offsets of 15 degrees resulted in approximately 45% of the sailfish being hooked in the throat or stomach, while sailfish caught on circle hooks with little or no offset (less than 4 degrees) tended to be hooked in the jaw or corner of the mouth. There was no observed difference in the catch percentage between the circle hooks with or without offset hook points. In summary, use of circle hooks resulted in measures of fishing success that were comparable to, or higher than, the traditional “J” hook. Circle hooks also minimized deep hooking, foul hooking and bleeding. Prince *et al.* conclude that use of circle hooks has considerable potential for promoting the live release of billfish in recreational fisheries.

4.4.5 Safety Issues Associated with the Fishery

The USCG does not maintain statistics on boating accidents, rescue, or casualty data specifically pertaining to recreational fishing as it does for the commercial industry. As a result, the HMS FMP and the Billfish Amendment contain only minimal safety information regarding recreational HMS fisheries. Safety issues associated with handline fisheries for tunas is discussed in Section 4.3.5. The USCG does compile statistics on recreational boating accidents and casualties, independent of the activity in which they are engaged. Coast Guard Safety Officer and Recreational Boats Safety Specialist, Lieutenant Keirsten Current cited two common situations that place recreational boaters in potential danger. Individuals in small vessels often venture out farther than the vessels are designed without the proper navigational equipment and may encounter rougher water than their boats can handle. Since fishermen targeting HMS species, particularly marlin, often travel at least 75 to 100 miles offshore, having a properly equipped vessel of adequate size is very important for the safety of recreational HMS constituents. The other situation that the Lieutenant noted as a frequent safety concern of the Coast Guard is when someone is up in the flybridge. Both of these situations can lead to people falling overboard. In 1997, approximately 70% of all boating casualties were due to drowning and in approximately 90% of all the drowning deaths, the victim was not wearing a personal floatation device (PFD).

Table 4.4.7 1997 Reported Boating Casualties. Source: USCG Lt. Current, personal communication.

Age Groups	# of Drowning Fatalities (victim was wearing a PFD)	# of Drowning Fatalities (victim was not wearing a PFD)	Total Number of Drowning Fatalities	
0-12	0	14	14	11
13-19	4	36	40	15
20-29	15	91	106	36
30-39	13	98	11	58
40-49	12	97	109	41
50-59	7	76	83	19
60-69	9	40	49	14
70-79	4	24	28	5
80-97	1	5	6	7
0-97	65	521	586	233

4.5 Fishery Data: ATLANTIC SHARKS

4.5.1 Overview of History and Current Management

Atlantic sharks are targeted primarily through bottom longline, drift gillnet, and rod and reel (commercial, recreational, and charter/headboats) gear types. Although discussions on other fisheries have been broken down by gear type, the nature of the shark catch and the method of data collection lend themselves to a stock-based analysis. As a result, some of the information overlaps with that found in other sections of the report.

The HMS FMP contained numerous new management measures for Atlantic sharks, including rebuilding programs for ridgeback and non-ridgeback large coastal sharks (LCS) and precautionary measures for pelagic and small coastal sharks (SCS). While the new measures for the recreational fishery were effective on July 1, 1999, many of the measures for the commercial fishery were not effective due to a June 30, 1999, court order. The commercial measures that did go into effect onto July 1, 1999, included limited access (including incidental catch limits), trip limits (4,000 lb LCS), and shark gillnet observer coverage. The commercial quotas for LCS, pelagic sharks, and SCS in 1999 and 2000 were the same as the 1997 quotas (1,285 mt dw, 580 mt dw, and 1760 mt dw, respectively). Additionally, the prohibited species provisions did not go into effect for the commercial fishery until June 2000, and the minimum size on ridgeback LCS are not in effect for the commercial fishery.

In 1999, the annual LCS quota (1,285 mt dw per court order) was exceeded by 493 mt dw or 38 percent. The impact of this quota overharvest on the LCS rebuilding program is unknown at this time. Only 31 percent and 17 percent of the pelagic (580 mt dw) and SCS (1760 mt dw) annual quotas, respectively, were taken. On November 24, 1999 (64 FR 66114), NMFS announced that the LCS fishery would remain open until March 31, 2000; the pelagic and SCS fisheries remained open for the entire semiannual season (Cortes, 2000). Dealer reports and state landing reports indicate that approximately 792 mt dw of LCS, 54 mt dw of pelagic, and 119 mt dw of SCS were taken in the first semiannual period of 2000. This exceeded the LCS semiannual quota of 642.5 mt dw by 149.5 mt dw or 23 percent.

On June 6, 2000 (65 FR 36855), NMFS announced that the second semiannual season for LCS would close on August 7, 2000 and, due to an overage in the first semiannual season, the quota was reduced to 542 mt dw. At the time this announcement was made, available landings data indicated that 180 mt dw had been landed over the first semi-annual quota (the actual overage was 149.5 mt dw). On June 12, 2000, the Court issued another order permitting NMFS to implement and enforce the 1999 prohibited species provisions. Based on the catch rates and the prohibited species provisions, NMFS announced on June 21, 2000 (65 FR 38440), that the prohibited species list in the HMS FMP would be enforced, the LCS season would be extended, and the new closure date would be August 15, 2000. As of September 6, 2000, dealer reports and state landing reports indicate that approximately 752 mt dw of LCS had been landed in the

second semiannual season. This was 210 mt dw (39 percent) over the available quota. Thus, as of September 6, 2000, the annual LCS quota for 2000 had already been exceeded by 259 mt dw or 20 percent. Only a total of 204 mt dw and 76 mt dw of pelagic and SCS, respectively, had been reported at that time.

On December 5, 2000 (65 FR 75867), NMFS announced that the LCS first semiannual season would close on March 24, 2000. Closure dates for the pelagic and SCS fisheries will be announced as necessary. On December 7, 2000, the Court approved a settlement agreement that was signed by NMFS and the plaintiffs in the two Southern Offshore Fishing Association et al. lawsuits. This settlement agreement dissolves the injunction and requires an independent review of the 1998 LCS stock assessment among other things. On January 2, 2001 (66 FR 55), NMFS announced that the pelagic shark quotas adopted in the HMS FMP would be enforced. These annual quotas are: 92 mt dw for porbeagle sharks; 273 mt dw for blue sharks; and 488 mt dw for pelagic sharks other than porbeagle or blue sharks. NMFS is developing an emergency rule that will implement management measures for the LCS and SCS fisheries consistent with the settlement agreement. NMFS will continue to monitor the fisheries and will close the fisheries if harvest data indicate that the quotas will be reached earlier than projected.

Also in 2000, NMFS released a draft National Plan of Action (NPOA) for the Conservation and Management of Sharks (65 FR 47968). The NPOA was developed pursuant to the endorsement of the International Plan of Action (IPOA) by the United Nations' Food and Agriculture Organization Committee on Fisheries Ministerial Meeting in February 1999. The overall objective of the IPOA is to ensure conservation and management of sharks and their long-term sustainable use. The final NPOA was released in early 2001, and, consistent with the Magnuson-Stevens Act, requires NMFS and the Regional Fishery Management Councils to undertake extensive data collection, analysis, and management measures in order to ensure the long-term sustainability of U.S. shark fisheries. The NPOA also encourages Interstate Marine Fisheries Commissions and State agencies to initiate or expand current data collection, analysis, and management measures and to implement regulations consistent with Federal regulations, as needed.

4.5.2 Most Recent Catch and Landings Data

Landings estimates for 1999 indicate that, compared to landings in 1998, commercial landings for LCS decreased by 302 mt dw (-14 percent; Tables 4.5.1 and 4.5.2), commercial landings for pelagic sharks decreased by 47 mt dw (-20 percent; Table 4.5.3), and commercial landings for SCS increased by 18 mt dw (+6 percent; Table 4.5.4). Similarly, harvest estimates in 1999 indicate that, compared to 1998, the number of LCS harvested in the recreational fishery decreased by 85,875 fish (-51 percent; Tables 4.4.2 and 4.4.3), the number of pelagic sharks harvested decreased by 649 fish (-6 percent; Tables 4.4.2 and 4.4.4), and the number of SCS decreased by 86,888 fish (-51 percent; Tables 4.4.2 and 4.4.5).

Table 4.5.1 **Estimates of Total Landings and Dead Discards for Large Coastal Sharks: 1981-1999**
 (numbers of fish in thousands). 1999 data are preliminary. Source: Cortes 2000

Year	Commercial Landings	Longline Discards	Recreational Catches	Unreported	Coastal Discards	Menhaden Fishery bycatch
1981	16.2	0.9	265.0	N/A	N/A	N/A
1982	16.2	0.9	413.9	N/A	N/A	N/A
1983	17.5	0.9	746.6	N/A	N/A	N/A
1984	23.9	1.3	254.6	N/A	N/A	N/A
1985	22.2	1.2	365.6	N/A	N/A	N/A
1986	54.0	2.9	426.1	24.9	N/A	N/A
1987	104.7	9.7	314.4	70.3	N/A	N/A
1988	274.6	11.4	300.6	113.3	N/A	N/A
1989	351.0	10.5	221.1	96.3	N/A	N/A
1990	267.5	8.0	213.2	52.1	N/A	N/A
1991	200.2	7.5	293.4	11.3	N/A	N/A
1992	215.2	20.9	304.9	N/A	N/A	N/A
1993	169.4	7.3	249.0	N/A	17.6	N/A
1994	228.0	8.8	160.9	N/A	22.8	26.2
1995	222.4	6.1	176.3	N/A	22.2	24.0
1996	160.6	5.7	188.5	N/A	16.1	25.1
1997	130.6	5.9	165.1	N/A	13.2	25.1
1998	174.9	4.3	169.8	N/A	11.2	25.1

Table 4.5.2 Commercial landings of Large Coastal Sharks in lb dw: 1997-1999. 1999 data are preliminary. Source: Cortes, 2000.

Large Coastal Sharks	1997	1998	1999
Basking**	none reported	none reported	none reported
Bignose*	2,132	50	9,035
Bigeye sand tiger**	none reported	none reported	none reported
Blacktip	1,506,182	1,893,805	1,286,979
Bull	40,247	27,389	25,426
Caribbean Reef*	3,548	100	none reported
Dusky*	80,930	81,124	110,950
Galapagos*	none reported	none reported	none reported
Hammerhead, Great	none reported	none reported	none reported
Hammerhead, Scalloped	none reported	none reported	none reported
Hammerhead, Smooth	none reported	none reported	none reported
Hammerhead, Unclassified	79,685	59,802	53,394
Lemon	20,595	23,232	23,604
Narrowtooth*	none reported	none reported	none reported
Night*	33	3,289	4,287
Nurse	8,864	2,846	1,168
Sandbar	890,881	1,077,161	1,299,987
Sand tiger**	8,425	38,791	6,401
Silky	13,920	13,615	8,649
Spinner	6,039	16,900	629
Tiger	6,603	12,174	30,274
Whale**	none reported	none reported	none reported
White**	1,315	none reported	82
Large Coastal Unclassified	1,177,539	1,258,027	978,312
Unclassified fins	140,638	76,588	80,393
Total	3,987,576 (1,809 mt dw)	4,584,893 (2,080 mt dw)	3,919,570 (1,778 mt dw)

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

** indicates species that were prohibited as of April 1997.

Table 4.5.3 Commercial landings of Pelagic Sharks in lb dw: 1997-1999. 1999 data are preliminary.
Source: Cortes, 2000.

Pelagic Sharks	1997	1998	1999
Bigeye thresher*	5,308	1,403	17,759
Bigeye sixgill*	none reported	none reported	none reported
Blue	904	706	1,111
Mako, Longfin*	7,867	4,971	4,619
Mako, Shortfin	224,362	224,421	170,860
Mako, Unclassified	71,371	79,773	58,344
Oceanic whitetip	2,764	22,049	698
Porbeagle	4,222	19,795	5,362
Sevengill*	none reported	none reported	none reported
Sixgill*	none reported	none reported	none reported
Thresher	145,253	102,531	96,012
Unclassified pelagic	75,543	49,626	46,056
Total:	537,594 (244 mt dw)	505,275 (229 mt dw)	400,821 (182 mt dw)

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

Table 4.5.4 Commercial Landings of Small Coastal Sharks in lb dw: 1997-1999. 1999 data are preliminary. Source: Cortes, 2000.

Small coastal sharks	1997	1998	
Atlantic Angel*	none reported	none reported	none reported
Blacknose	202,781	119,689	130,317
Bonnethead	75,787	13,949	53,702
Finetooth	169,733	267,224	246,404
Sharpnose, Atlantic	256,562	230,920	239,647
Sharpnose, Caribbean*	none reported	none reported	2,039
Unclassified Small Coastal	51	82	136

Total:	704,914 (320 mt dw)	631,864 (287 mt dw)	672,245 (305 mt dw)
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* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

4.5.3 U.S. vs. International Breakdown of Landings

As previously stated, there is no comprehensive international reporting system for Atlantic shark catches and landings. While there are some international data, not all countries report and those that do use varying reporting methods.

4.5.4 Bycatch Issues and Data Associated with the Fishery

General

Bycatch of sharks occurs in many fisheries, including trawl, set-net, and hook and line fisheries. Estimates of shark dead discards from the pelagic longline fishery range from 4,300 to 9,000 fish in 1998 and 1999 (Cramer, 1999; Cramer and Adams, 2000). Observer data collected from the directed bottom longline shark fishery indicate that LCS discarded dead represent approximately 2.7 percent of the total mortality of these species in 1999 (Cortes, 2000). Observer data in the Gulf of Mexico menhaden fishery for the period 1994-1995 indicate that 75 percent of the sharks encountered died (Cortes, 2000).

Shark Drift Gillnet and Strikenet Fisheries

Current regulations require that the southeast shark gillnet fishery have 100 percent observer coverage during the right whale season (November 15 through April 1) from approximately West Palm Beach, FL to Sebastian Inlet, FL. In 1999, shark fishermen began to strikenet for sharks (Carlson, 2000). Unlike drift gillnets which are set in a straight line and left to fish passively, strikenets are rapidly set in a circle around a school of sharks and require more than one vessel. Observer data from the 2000 Right Whale season indicate that drift gillnets caught 14 species of sharks (90.2% of 6,479 animals caught), 33 species of teleosts and rays (5.3% percent were teleosts, 4.5% were rays), 1 species of sea turtle (0.02% of the 6,479 animals caught), and 2 species of marine mammals (0.03% of the 6,479 animals caught; Tables 5.5.9 and 5.5.10) (Carlson, 2000). Blacktip, finetooth, and bonnethead sharks made up 93.1% of the number of sharks caught (Carlson, 2000). Observer data also indicate that strikenets caught 2 species of sharks (99.3% of the 910 animals caught) and 2 species of teleosts and rays (0.7% of the 910 animals caught) (Carlson, 2000). No protected resources were caught while strikenetting. Blacktip sharks made up 99.9% of the shark catch when strikenetting.

While no shark species were discarded dead in the strikenet fishery, some scalloped hammerhead, common threshers, Atlantic sharpnose, and great hammerheads were discarded dead in the drift gillnet fishery. The total catch for the drift gillnet fishery can be found in Tables 4.5.9 and 4.5.10.

Table 4.5.5 Total Shark Catch in NMFS Observed Driftnet Sets During 2000 Critical Right Whale Season: Source: Carlson, 2000.

Species	Total Number Caught	Percentage Kept	Discarded Alive (%)	
Blacktip	3,013	99.8	0.1	0.1
Finetooth	1,230	99.6	0.0	0.4
Bonnethead	1,199	98.7	0.3	1.0
Scalloped hammerhead	110	59.1	0.0	40.9
Blacknose	92	100.0	0.0	0.0
Common thresher	45	26.7	11.1	62.2
Atlantic sharpnose	32	34.3	30.3	34.4
Sandbar	29	96.5	0.0	3.5
Large hammerhead	26	100.0	0.0	0.0
Bull	24	100.0	0.0	0.0
Spinner	18	100.0	0.0	0.0
Silky	7	100.0	0.0	0.0
Great hammerhead	7	42.8	0.0	57.2
Tiger	6	66.7	33.3	0.0
Lemon	5	100.0	0.0	0.0

Table 4.5.6 Total Bycatch in NMFS Observed Driftnet Sets During 2000 Critical Right Whale Season:
Source: Carlson 2000

Species	Total Number Caught	Percentage Kept	Discarded Alive (%)	
Cownose Ray	169	0.6	86.4	13.0
Spotted Eagle ray	113	13.3	75.2	11.5
Drums	39	0.0	0.0	100.0
Cobia	37	100.0	0.0	0.0
King Mackerel	36	97.2	0.0	2.8
Spanish Mackerel	36	77.8	0.0	22.2
Tarpon	35	0.0	2.9	97.1
Tripletail	24	91.7	8.3	0.0
Bluefish	21	61.9	0.0	38.1
Great Barracuda	19	100.0	0.0	0.0
Herring	18	0.0	0.0	100.0
Permit	15	66.7	0.0	33.3
Menhaden	9	0.0	0.0	100.0
Sea trout	9	0.0	0.0	100.0
Unknown teleost	8	0.0	0.0	100.0
Red Drum	6	33.3	66.7	0.0
Atlantic Stingray	5	80.0	20.0	0.0
Blue runner	3	66.7	0.0	33.3
Little tunny	3	33.3	0.0	66.7
Atlantic sailfish	3	0.0	0.0	100.0
Atlantic manta ray	3	0.0	100.0	0.0
Pigfish	3	0.0	0.0	100.0
Spadefish	2	0.0	0.0	100.0
Banded croaker	2	0.0	0.0	100.0
Pompano	2	100.0	0.0	0.0

Species	Total Number Caught	Percentage Kept	Discarded Alive (%)	
Wahoo	1	100.0	0.0	0.0
Jacks	1	0.0	0.0	100.0
Crevalle jack	1	100.0	0.0	0.0
Atlantic bumper	1	0.0	0.0	100.0
Southern stingray	1	0.0	0.0	100.0
Black grouper	1	100.0	0.0	0.0
Gag grouper	1	100.0	0.0	0.0
Flounder	1	100.0	0.0	0.0
Harvestfish	1	0.0	0.0	100.0
Black drum	1	100.0	0.0	0.0
Atlantic bonito	1	100.0	0.0	0.0
Lookdown	1	0.0	0.0	100.0
Spotted dolphin	1	0.0	100.0	0.0
Bottlenose dolphin	1	100.0	0.0	0.0
Loggerhead turtle	1	100.0	0.0	0.0
Skate	1	100.0	0.0	0.0

4.6 Fishery Data: LANDINGS BY SPECIES

The following tables are taken from the 2000 National Report of the United States to ICCAT (SCRS/00/142). The purpose of this section is to provide a summary of recent landings of HMS on a species by species basis for comparison to Sections 4.1 through 4.5 of the 2001 HMS SAFE report.

Figure 4.6.1. Geographic areas used in summaries of pelagic logbook data from 1992 - 1998; ICCAT areas (91 to 96) are also shown. (Cramer and Adams, 2000)

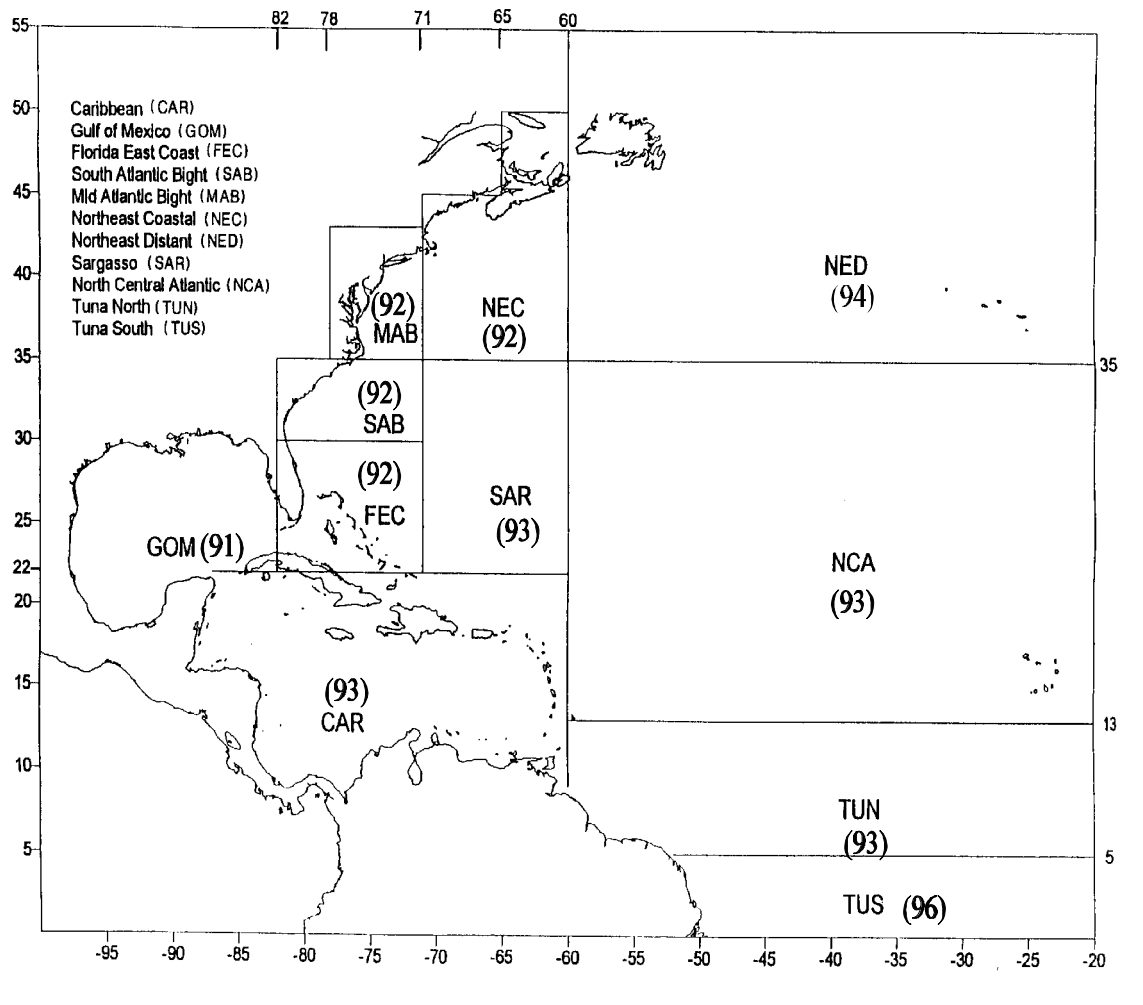


Table 4.6.1. U.S. Landings (Mt) of Bluefin Tuna by Gear and Area for 1996 to 1999.

Area	Gear	1996	1997	1998	1999
NW Atlantic	Longline	31.7	26.0	30.5	25.1
	Handline	32.5	17.4	29.2	15.5
	Purse Seine	245.0	249.7	248.6	247.9
	Harpoon	95.7	97.5	133.1	115.8
	*Rod and reel (>145 cm LJFL)	588.5	752.6	610.4	657.5
	*Rod and reel (<145 cm LJFL)	251.7	178.9	166.3	103.0
	Unclassified	2.8	2.2	0.6	0.1
Gulf of Mexico	Longline	36.2	23.8	18.3	48.4
	*Rod and reel	0.0	0.0	0.0	0.4
	All Gears	1284.1	1348.1	1237	1213.7

* Rod and Reel catches and landings represent estimates of landings and dead discards when available based on statistical surveys of the U.S. recreational harvesting sector.

Table 4.6.2. U.S. Landings (mt) of Yellowfin Tuna by Gear and Area from 1996 to 1999 .

Area	Gear	1996	1997	1998	1999
NW Atlantic	Longline	728.3	838.9	464.9	581.3
	Rod and reel*	4484.8	3560.9	2845.7	3818.2
	Troll	371.0	218	177.5	0
	Purse seine	6.8	0	0	0
	Gillnet	13.2	1.3	1.7	0.2
	Trawl	7.3	1.9	0.7	4.1
	Harpoon	0	0	0	0
	Handline	37.2	34.3	0	192
	Trap	0	**	0.1	0.8
	Unclassified	0.4	0	0	2.1
Gulf of Mexico	Longline	2164.8	2571.3	1864.5	2736.6
	Rod and reel*	13.2	7.7	80.9	149.4
	Handline	47.0	55.6	60.8	12.7
	Gillnet	0	0	0	**
	Uncl	19.6	0	0	0
Caribbean	Longline	34.2	135.4	58.6	24.4
	Troll	0	19.6	0	0
	Handline	0	.7	3.9	14.5
	Gillnet	0	**	0	0
	Trap	0	.1	0	0.1
NC Area 94a	Longline	319.3	6.1	4.6	0.2
SW Atlantic	Longline	38.4	221.9	55.3	32.4
All Gears		8285.5	7673.7	5619.2	7569

** \leq 0.05 mt* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

Table 4.6.3. U.S. Landings (mt) of Skipjack Tuna by Gear and Area from 1996 to 1999.

Area	Gear	1996	1997	1998	1999
NW Atlantic	Longline	.1	1.0	0.7	0.3
	Rod and reel*	48.1	42.0	49.5	63.6
	Troll	.9	.6	0.4	0
	Purse seine	.7	0	0	0
	Gillnet	18.5	8.9	16.9	26.5
	Trawl	0	0	0.2	1.0
	Handline	0.3	.1	0	0.2
	Trap	15.2	0	0	17.5
	Pound	0	0	0	0
	uncl	**	0	0	0
Gulf of Mexico	Longline	.2	1.3	0.6	0.4
	Rod and reel*	36.4	21.7	37.0	34.8
	Handline	0.1	0	0	0.4
	Trap	0	0	0	0
Caribbean	Longline	0	1.2	0	1.3
	Gillnet	0	.2	0	0.4
	Harpoon	0	0	0	0
	Handline	0	0	0	5.8
	Trap	0	**	0	0.1
	Troll	**	7.3	0	0
	uncl	0	0	0	0
SW Atlantic	Longline	0	**	0	0
All Gears		120.5	84.3	105.3	152.3

** \leq 0.05 mt

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

Table 4.6.4. U.S. Landings (mt) of Bigeye Tuna by Area and Gear for 1996-1999.

Area	Gear	1996	1997	1998	1999
NW Atlantic	Longline	333.0	476.3	544.3	737.8
	Rod and reel*	108.2	333.5	228.0	316.1
	Troll	4.1	3.9	4.0	0
	Gillnet	4.2	**	0.4	0.2
	Handline	16.4	2.7	0	11.9
	Pairtrawl	0	0	0	0
	Trawl	1.4	1.0	0.5	1.2
	Harpoon	0	0	0	0
	Haul Seine	0	0	0	0
	Uncl	0.1	.5	0	0.9
Gulf of Mexico	Longline	30.9	33.9	25.6	54.6
	Rod and reel*	0	0	0	1.8
	Handline	0.9	**	0.1	0.2
Caribbean	Longline	32.8	50.0	48.5	23.2
	Handline	0	0	0	0.2
NC Area 94a	Longline	228.9	91.8	48.4	35.3
SW Atlantic	Longline	34.9	142.8	28.5	78.2
All Gears		795.8	1136.4	928.3	1261.6

** ≤ 0.05

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

Table 4.6.5. U.S. Landings (mt) of Albacore Tuna by Gear and Area for 1996 to 1999.

Area	Gear	1996	1997	1998	1999
NW Atlantic	Longline	63.6	140.0	155.4	179.5
	Gillnet	30.7	42.8	40.1	27.0
	Handline	3.7	4.8	0	0.6
	Trawl	1.7	2.6	2.4	0.4
	Troll	2.7	1.6	5.8	0
	Rod and reel*	277.8	220.2	601.1	90.1
	Pair Trawl	0	0	0	0
	Pound	3.5	1.3	0.9	0.4
	Uncl	21.1	0.2	0	0
Gulf of Mexico	Longline	5.7	16.9	3.9	3.8
	Rod and reel*	61.7	49.3	0	0
	Handline	0.1	0	0	**
Caribbean	Longline	6.6	16.1	17.8	8.3
	Troll	0	3.6	0	0
	Gillnet	0	**	0	0.2
	Trap	0	**	0	**
	Handline	0	0	0	3.8
NC Area 94a	Longline	32.4	11.4	1.6	1.5
SW Atlantic	Longline	1.1	4.7	1.4	1.4
	All Gears	512.4	515.5	830.4	317

** ≤ 0.05 mt

* Rod and Reel landings are estimates of landings and dead discards, when available.

Table 4.6.6. U.S. Catches and Landings (mt) of Swordfish by Gear and Area for 1996 to 1999.

Area	Gear	1996	1997	1998	1999
NW Atlantic	* Longline	1310.4	1262.2	1624.1	1872.3
	Gillnet	77.8	.4	36.3	0
	Pair Trawl	0	0	0	0
	Handline	.1	1.3	0	5.0
	Trawl	19.8	8.0	5.9	7.5
	Troll	7.3	0.4	0.7	0
	* unclassified	25.8	11.9	9.1	3.8
	Harpoon	.5	.7	1.5	0
	** Rod and Reel	5.92	10.91	4.71	21.32
	Trap	0	0	0.1	**
Gulf of Mexico	* Longline	896.3	759.9	633.1	579.6
	Handline	0	0	0	**
Caribbean	* Longline	1180.0	688.9	516.0	260.5
NC Atlantic	* Longline	629.4	688.2	658.6	650.0
SW Atlantic	* Longline	172.6	417.9	170.1	185.2
	All Gears	4325.92	3850.71	3660.21	3585.22

* includes landings and estimated dead discards from scientific observer and logbook sampling programs.

** \leq 0.5 mt

Table 4.6.7. U.S. Landings (mt) and dead discards of Blue Marlin, White Marlin and Sailfish by Gear and Area for 1997-1999.

		Blue Marlin			White Marlin			Sailfish		
Area	Gear	1997	1998	1999	1997	1998	1999	1997	1998	1999
NW Atlantic	Longline*	18.7	23.3	22.0	11.2	15.3	18.6	9.2	6.4	13.7
	Unclassified*		0.62			0.7	0.06		0.06	
	Rod and reel**	25.0	34.1	24.8	0.9	2.4	1.5	0.0	0.1	0.07
Gulf of Mexico	Longline*	51.0	18.5	55.2	15.4	11.8	31.5	13.3	17.0	57.4
	Rod and reel**	11.5	4.5	7.5	0.9	0.2	0.1	0.4	1.0	0.6
Caribbean	Longline*	24.6	2.3	1.6	6.6	1.3	5.04	3.3	0.2	0.46
	Rod and reel**	8.6	10.6	4.6	0.0	0.02	0.0	0.2	0.05	0.0
	Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unknown & NC Area 94a	Longline*	2.3	6.1	1.6	0.5	2.8	1.08	0.0	0.8	0.02
SW Atlantic	Longline*	41.5	1.6	1.7	37.1	0.9	0.45	31.9	2.7	0.02
	All Gears	183.2	101.6	119.0	72.6	35.4	58.3	58.3	28.3	72.3

* includes landings and estimated discards from scientific observer and logbook sampling programs.

** Recreational billfish landings estimates are based on tournament reports and the Large Pelagic Survey (see Section 2.3 of the Billfish Amendment).

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